

ULTRAFAST ALL-OPTICAL SWITCH USING
CARBON NANOTUBE POLYMER COMPOSITES

ABSTRACT

An ultrafast all-optical nonlinear switch. The switch has as
5 components a substrate and a material disposed on the substrate. In one
embodiment, the material includes a plurality of single-walled carbon nanotubes
and a polymer forming a composite. Preferably, the polymer is polyimide. In
another embodiment, the material includes a plurality of single-walled carbon
nanotubes incorporated into a silica. The nanotube loading in the material is less
10 than about 0.1 wt %. The material is a substantially transparent, third-order
nonlinear optical material. The switch has a switching speed of less than 1
picosecond for light with a wavelength of about 1.55 micrometers. Also
disclosed is a process for preparing the ultrafast all-optical nonlinear switch.

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